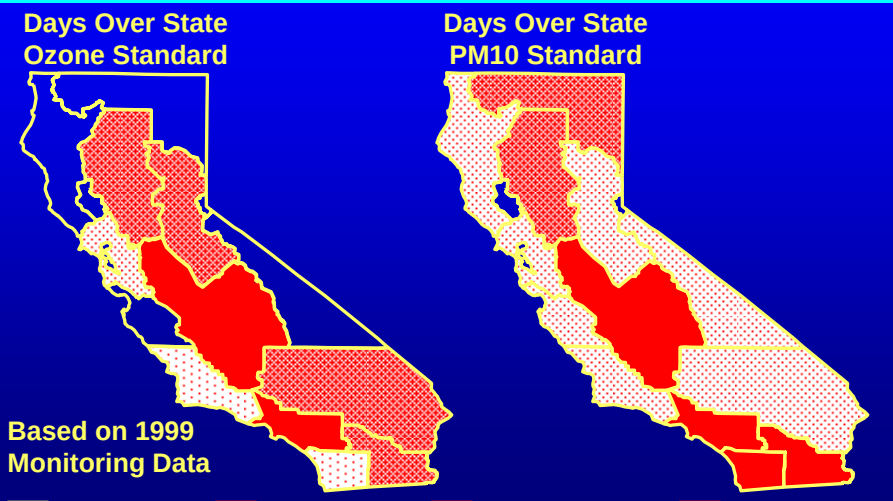
Presentation Outline

- Background
- Fleet Rule For Transit Agencies
- Calculating TFV Requirements
- TFV Reporting

Over 90% of Californians Breathe Unhealthy Air at Times



Significant Health Impacts Attributed to Diesel PM

- 2,900 premature deaths compared to 3,700 car accident deaths and 2,000 homicides in 2001

- 2,500 chronic bronchitis cases
- 240,000 asthma attacks and respiratory symptoms
- 3,600 hospital admissions
- 600,000 lost work days
- 3.2 million minor restricted activity days

Diesel Risk Reduction Plan

- Adopted 2000
  - 75 percent risk reduction by 2010
  - 85 percent risk reduction by 2020
- Multiple Strategies:
  - Stringent new engine standards
  - Cleaner diesel fuel (<15 ppm sulfur)
  - Ensure in-use emissions performance
  - Aggressive reductions from in-use engines

Why Reduce In-use Diesel Emissions?

- Diesel Engines are Long Lived
- New Engine Standards Offer Long Term Reductions
- In-use Emission Rules Provide Near-Term Reductions
- Control Technology is Available

Adopted In-Use Regulations

12 Regulations Adopted

2002 - 2005

Future In-Use Regulations

- Harbor Craft
- Ocean Vessels - Propulsion Engines (Non-regulatory)
- Off-Road Equipment
- On-Road Privately Owned Fleets
- Agricultural Off-Road Equipment

Engine or Vehicle Certification

- California or "50 State" Certification Required
  - Not "49 state" or federal engine
- Engine or Vehicle Manufacturer Certifies
  - Vehicle Certification (ZEV, PZEV, SULEV, LEV, TLEV)
    - Passenger Car
    - Light-duty Truck
    - Medium Duty Vehicle (up to 10,000 gvwr)
  - "Heavy-duty Engine" Certification
    - Based on the Intended Service Class of the "Incomplete" Vehicle
    - Intended Service Class set in Federal Code of Regulations (40 CFR Chapter 1, Part 86, Subchapter C, Subpart A 86.085-2)

Intended Service Class

- Heavy-duty (HD) Engine

  An engine operating on a heavy-duty duty cycle within its intended service class will meet the heavy-duty engine exhaust emission standards (title 13, California Code of Regulations, section 1956.8).
  - Light HD >8,500-14,000 gvwr
  - Medium HD >14,000-33,000 gvwr
  - Heavy HD >33,000 gvwr
- Urban Bus (UB) Engine

  A heavy heavy-duty engine operating on an urban bus duty cycle that will meet the urban bus engine exhaust emission standards (title 13, California Code of Regulations, section 1956.1).

Fleet Rule for Transit Agencies

title 13, CCR, section 2023 et seq.

URBAN BUS:
- 33,000 lbs GVWR or greater
- Urban Bus Engine
- Fleet NOx Average
- % PM Reduction from 2002 Diesel UB Baseline
- Fuel Path Selection
- ULSD Fuel Requirement

Section 2023.1

TRANSIT FLEET VEHICLE:
- >8,500 lbs GVWR (not UB)
- Heavy-Duty Truck Engine
- Fleet NOx Average
- % PM Reduction from 2005 Diesel TFV Baseline
- "Commuter Service Buses"
- Non-revenue Service Vehicles

Section 2023.2

Urban Bus

Section 2023(a)(13)

- Powered by or "Normally" Powered by a Heavy Heavy-duty Diesel Engine
  - 35' or Longer
  - Over 33,000 pounds GVWR
- Passenger Carrying
  - Fixed Route Service
- "Urban Bus" Engine Exhaust Emissions Standards

NOx Engine Exhaust Emission Standard

(grams per brake horse power-hour)

Model Year	**Urban Bus (1956.1)**	Heavy-Duty (1956.8)
1988	**6.0**	6.0
1990	**6.0**	6.0
1991	**5.0**	5.0
1996	**4.0**	5.0
1998	**4.0**	4.0
Oct. 2002	**2.2**	2.2
2004	**0.5 (diesel), 2.2 (Alt.)**	2.2
2007	→	1.2
2010	→	0.2

PM Engine Exhaust Emission Standard

(grams per brake horse power-hour)

Model Year	**Urban Bus (1956.1)**	Heavy-Duty (1956.8)
1988	**0.6**	0.6
1991	**0.1**	0.25
1993	**0.1**	0.25
1994	**0.07**	0.1
1996	**0.05**	0.1
Oct. 2002	**0.01**	0.1
2007	→	0.01

"Urban Bus" Fleet Requirements
(section 2023.1)

- Fuel Path Selection (Diesel or Alternative Fuel)
  - Purchasing Requirement
  - PM Compliance Schedules
- Low Sulfur (<15 ppm) Diesel Fuel
  - As of July 1, 2002
- 4.8 g/bhp-hr NOx Fleet Average
  - As of October 1, 2002
- PM Reductions 2003 Through 2008
  - Goal Is 85% Reduction From 2002 Baseline

Transit Fleet Vehicles

Adopted February 24, 2005




TFV Definition

"Transit Fleet Vehicle" means an on-road vehicle greater than 8,500 pounds gross vehicle weight rating (GVWR) powered by a heavy-duty engine fueled by diesel or alternative fuel, owned or operated by a transit agency, and which is not an urban bus.

Section 2023(a)(12)

Transit Fleet Vehicles

- Paratransit Buses
- Dial-a-Ride Buses
- Tow Trucks and Other Non-revenue Service Vehicles
- Charters
- "Commuter Service" Buses

"Commuter Service Bus"

" … means a passenger-carrying vehicle powered by a heavy heavy-duty diesel engine or of a type normally powered by a heavy heavy-duty diesel engine that is not otherwise an urban bus and which operates on a fixed route primarily during peak commute hours and that has no more than ten scheduled stops per day, excluding park-and-ride lots. A commuter service bus is a transit fleet vehicle."

Section 2023(a)(2)

Private/Non-Profit Buses

Private/non-profit buses providing service for a Public Transit Agency are subject to the Fleet Rule for Transit Agencies.

Not Transit Fleet Vehicles

- Gasoline vehicles
- "Low Usage Vehicle“
  - Non-revenue
  - ≤1000 miles/year
- Shuttles
  - Airports, Prisons, Non-profits, Hospitals, Colleges and Universities
  - Only Provides Service To Its “Own” Clientele
  - Publicly Owned Vehicles Subject To Fleet Rules For Public Agencies and Utilities
- “California Medium Duty Vehicle”

TFV Requirements

- Only In-Use Fleet Requirements
  - Emission Reductions Through Fleet Modernization or Retrofit
- Not Required
  - Fuel Path Selection
    - Purchasing Requirements
  - Ultra Low Sulfur Diesel
    - National – Sept 2006
  - Stricter Urban Bus Engine Emission Standard

TFV Requirements
In-Use Fleet Emission Reduction

- Maximum Allowable NOx Fleet Average
  - Section 2023.2 (a)
- Percentage Reduction in PM Emissions from 2005 baseline
  - Section 2023.2 (b)
- Deadlines December 31, 2007 & 2010
- Based on Engine Emission Standards
  - Certified by Engine Manufacturers

NOx Engine Exhaust Emission Standard

(grams per brake horse power-hour)

Model Year	Urban Bus (1956.1)	**Heavy-Duty (1956.8)**
1988	6.0	**6.0**
1990	6.0	**6.0**
1991	5.0	**5.0**
1996	4.0	**5.0**
1998	4.0	**4.0**
Oct. 2002	2.2	**2.2**
2004	0.5 (diesel), 2.2 (Alt.)	**2.2**
2007	→	**1.2**
2010	→	**0.2**

PM Engine Exhaust Emission Standard

(grams per brake horse power-hour)

Model Year	Urban Bus (1956.1)	**Heavy-Duty (1956.8)**
1988	0.6	**0.6**
1991	0.1	**0.25**
1993	0.1	**0.25**
1994	0.07	**0.1**
1996	0.05	**0.1**
Oct. 2002	0.01	**0.1**
2007	→	**0.01**

UB and TFV NOx Fleet Average Requirement

Fleet Type	Compliance Date		
	10/01/02	12/31/07	12/31/10
Urban Bus	4.8[a]		
Transit Fleet Vehicles		**3.2[a,b]**	**2.4[a,c]**

a in g/bhp-hr
b or retire 1997 or older TFV
c or retire 2001 or older TFV

UB and TFV Percentage Diesel PM Reduction

Fleet Type	Baseline	% Reduction From Baseline				
	Year[b]	2004	2005	2007	2009	2010
Urban Bus[a]						
Alternative	2002	20	40	60	85[c]	
Diesel	2002	40	60	85		
TFV [a]	**2005**			**40**		**80[c]**

a Deadlines for compliance are:
UB = January 1st of each year
TFV = December 31st of each year
b Baseline is established as of January 1st of the year
c Transit agencies may also meet a fleet average of 0.01 g/bhp-hr

Extensions

section	
2023 (e)	Financial Hardship
2023 (f)	Technology Unavailable
2023 (g)	One-hour Ozone Attainment
2023.2 (c)	Contract Operations

Extensions

Financial Hardship

section 2023 (e)

- Applicable <30 vehicles (UB + TFV)
- Extension of applicable deadlines
- Apply to the Executive Officer
  - Cost, source of funds, shortfall
  - Dates for achieving compliance
- 30 days prior to the applicable deadlines

Extensions

Technology Unavailable

section 2023 (f)

- 1-year extension of applicable PM compliance deadlines
- Apply to the Executive Officer
  - Demonstrate that technology is unavailable
  - Explain why older buses cannot be retired
  - Schedule for compliance
- 90 days prior to the applicable deadlines

Extensions

One-hour Ozone Attainment Area

section 2023 (g)

- Applicable <20 vehicles (UB + TFV)
- Federal one-hour ozone attainment area
- Remove requirement of intermediate PM deadlines
- No application required

Extensions

Contract or “Turnkey” Operations

section 2023.2 (c)

- Applicable for TFVs only
- Delay up to one year
  - Termination of contract
- Apply to the Executive Officer
- 90 days prior to the applicable deadlines

Reporting Requirements
section 2023.4(e)

- January 31st of each year thru 2016
  - Number, manufacturer, make, and model year of engines and fuel used
- January 31, 2006 Report
  - TFV PM Baseline as of 1/1/2005
  - TFV Fleet as of 1/1/2006
  - TFV NOx Fleet Average as of 1/1/2006
  - TAs proposed actions to achieve the 12/ 31/ 2007 NOx requirements
- Late Penalty of $100 per day

Emissions Requirement Calculations

Calculations

TFV NOx Average Calculation

- Sum of the NOx engine certification standard (g/bhp-hr) of each transit fleet vehicle engine
  - include diesel and alternative fueled vehicles, not gasoline.
- Divide by the total numbers of vehicles in the TFV fleet
- Example Fleet:

  1 (1995 MY), 6 (2002 MY), 4 (2003 MY)

  (Handout)

TFV NOx Average Calculation (current fleet)

Example:

Qty	Engine	Std.	Total NOx
1	1995 MY	5.0 g	5.0
6	2002 MY	4.0 g	24.0
4	2003 MY	2.2 g	8.8
11	Total Fleet		37.8

Average (37.8 / 11) = 3.44 g/bhp-hr

Exceeds required maximum 3.2 g/bhp-hr

TFV NOx Average Reduction (future fleet - diesel replacement)

Example:

Qty	Engine	Std.	Total NOx	
1	2007 MY	1.2 g	1.2	replace 1995 MY
6	2002 MY	4.0 g	24.0	
4	2003 MY	2.2 g	8.8	
11	Total Fleet		34.0	

Average (34.0 / 11) = 3.09 g/bhp-hr

Meets required maximum 3.2 g/bhp-hr

TFV NOx Average Reduction (future fleet - gasoline replacement)

Example:

Qty	Engine	Std.	Total NOx	
-	gasoline	-	-	replace 1995 MY
6	2002 MY	4.0 g	24.0	
4	2003 MY	2.2 g	8.8	
10	Total Fleet		32.8	

Average (32.8 / 10) = 3.28 g/bhp-hr

Exceeds 3.2 but all 1997 MY and older are retired

TFV PM Calculation

- Establish Fleet 2005 Baseline
  - Diesel TFV Fleet as of January 1, 2005
  - Sum of the PM engine certification standard (g/bhp-hr) of each diesel transit fleet vehicle
    - Example Fleet: 11 diesel TFV (MY 1994-2006)
      1 (1995 MY), 6 (2002 MY), 4 (2003 MY)
- Required Reduction from 2005 Baseline
  - On December 31, 2007, fleet total must meet a 40% reduction from 1/1/2005 Baseline

TFV PM Baseline Calculation (fleet as of 1/1/2005)

Example:

Qty	Engine	Std.	Total PM
1	1995 MY	0.1 g	0.1
6	2002 MY	0.1 g	0.6
4	2003 MY	0.1 g	0.4
11	Total Fleet		1.1 on 1/1/2005

Required 40% reduction - 0.44

Maximum PM as of 12/31/07 0.66 g/bhp-hr

TFV PM Reduction Calculation (future fleet - diesel replacement)

Example:

Qty	Engine	Std.	Total PM	
1	2007 MY	0.01 g	0.01	replace 1995
6	2002 MY	0.1 g	0.6	
4	2003 MY	0.1 g	0.4	
11	Total Fleet		1.01	reduced PM

Maximum PM 12/31/07 — 0.66 g/bhp-hr

(required 40% reduction) — Not compliant

TFV PM Reduction Calculation (diesel replacement & install DPFs)

Example:

Qty	Engine	Std.	Total PM	
1	2007 MY	0.01 g	0.01	replace 1995
5	2002 MY	0.1 g	0.075	install DPF
1	2002 MY	0.1 g	0.1	
4	2003 MY	0.1 g	0.4	
11	Total Fleet		0.585	reduced PM

Maximum PM 12/31/07 — 0.66 g/bhp-hr

(required 40% reduction) — Compliant

TFV PM Reduction Calculation (future fleet - gasoline replacement)

Example:

Qty	Engine	Std.	Total PM	
-	gasoline	-	-	replace 1995
4	2002 MY	0.1 g	0.06	install DPF
2	2002 MY	0.1 g	0.2	
4	2003 MY	0.1 g	0.4	
10	Total Fleet		0.66	reduced PM

Maximum PM 12/31/07 (required 40% reduction) — 0.66 g/bhp-hr Compliant

ARB Verification Program

- Protects the transit agency
  - by ensuring after-market diesel emission control strategies obtain claimed emission reductions, and
  - by providing a warranty.

http://arb.ca.gov/diesel/verdev/home/home.htm

Current Level 1 Verifications

http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies.cvt.htm

Product Name	PM Reduction	NOx Reduction
Cleaire Flash and Match	25%	25%
Donaldson DCM 6000	25%	
Donaldson 6000 + Spiracle	25%	
Donaldson DCM 6100	25%	
Donaldson DCM 6100 + Spiracle	25%	
Extengine	25%	80%
ECS AZ Purimuffler/Purifier	25%	

Current Level 2 Verifications

http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies.cvt.htm

Product Name	PM Reduction	NOx Reduction
Donaldson	50%	
ESW Particulate Reactor	50%	
Lubrizol PuriNOx	50%	15%
ECS AZ Purimuffler/Purifier	50%	20%
Johnson Matthey PCRT	50%	
Rypos ADPF	50%	

Current Level 3 Verifications

http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies.cvt.htm

Product Name	PM Reduction	NOx Reduction
Cleaire Flash and Catch CRT	85%	25%
Cleaire Flash and Catch DPX	85%	25%
Cleaire Horizon	85%	
Cleaire Longview	85%	25%
CleanAIR Systems PERMIT™	85%	
Donaldson	85%	
International DPX	85%	
Johnson Matthey CRT	85%	
Johnson Matthey CCRT	85%	
Johnson Matthey EGRT	85%	40%
Lubrizol ECS Purifilter	85%	
Lubrizol ECS Unikat Combifilter	85%	

Diesel Emission Control Strategy Family Name

CA/MMM/YYYY/PM#/N##/APP/XXXXX

CA: California verified strategy

MMM: Manufacturer code, usually the company's initials

YYYY: Year of verification

PM#: Level of PM reduction (Level 1,2, or 3)

N##: Level of NOx reduction, if any

APP: Application or use such as stationary (ST), on-road (ON) or off-road (OF)

XXXXX: Alphanumeric code issued by the E.O.

Exercise

- Calculate your NOx and PM reductions for your fleet

Annual Reporting

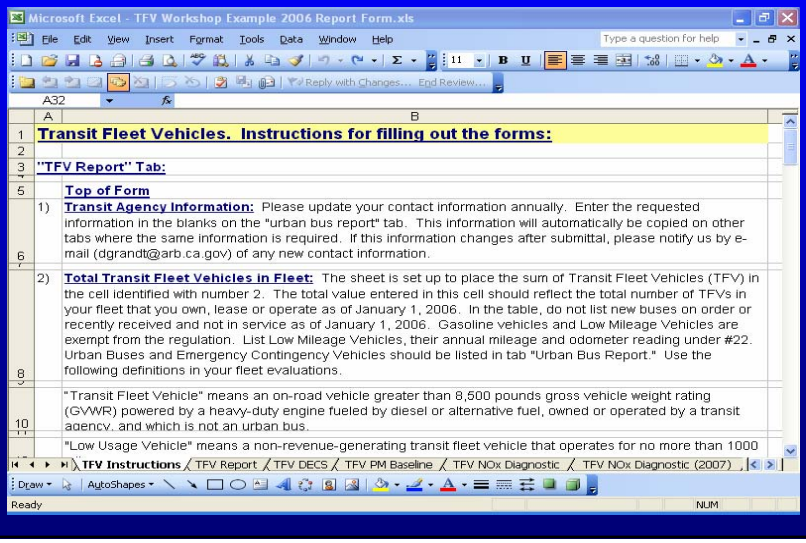
(Handout)

www.arb.ca.gov/msprog/bus/reportingforms.htm

Reporting TFV Fleet

- TFV Instructions
- TFV 2005
  TFV 2006
  Other TFV
- TFV DECS
- TFV PM Baseline
- TFV NOx
- TFV NOx (2007)

TFV Instructions



TFV Fleet 1/1/2005 Inventory

TFV as of January 1, 2005							
5) No. of TFVs	6) Engine Manufacturer	7) Engine Model ID	8) Engine Model Yr.	9) TFV Model Yr.	10) Fuel Used	11) Type of DECS used	12) No. of buses
1	Navistar	A230c	1995	1995	Diesel		
7	Cummins	ISB	2000	2000	Diesel		
3	Cummins	ISB	2003	2003	Diesel		
1	Cummins	B5.9G	1999	1999	CNG		

TFV Fleet 1/1/2006 Inventory

TFV as of January 1, 2006							
13) No. of TFVs	14) Engine Manufacturer	15) Engine Model ID	16) Engine Model Yr.	17) TFV Model Yr.	18) Fuel Used	19) Type of DECS used	20) No. of buses
7	Cummins	ISB	2000	2000	Diesel	DPF	3
3	Cummins	ISB	2003	2003	Diesel		
1	Navistar	C175	2006	2006	Diesel		
1	Cummins	B5.9G	1999	1999	CNG		

Reporting Optional Standards

21) Optional Standards

# of TFV	Engine Manufacturer	Engine Model ID	Engine MY	Vehicle MY	Fuel Used	PM Standard	NOx Std (Note)	Exec Order Number
1	Cummins	B5.9G	1999	1999	CNG		2.2	A-010-9999

Note:NOx Std (if in NOx+NMHC, please indicate)

Reporting Low Mileage

22) Low Mileage Vehicles

Vehicle ID	Engine Manufacturer	Engine Model ID	Engine MY	Vehicle MY	Fuel Used	Annual Mileage	Odometer Reading
1899	Navistar	A230c	1995	1995	Diesel	900	377,000

DECS 1/1/2006 Inventory

TFV as of January 1, 2006

1) TFV ID	2) Eng Mod ID	3) Eng Mod Yr.	4) DECS Type	5) DECS Manufacturer	6) DECS Family Name	7) Serial Number	8) Date Installed
1901	ISB	2000	DPF	Johnson Matthey	CA/JMI/2005/PM3/N00/ON/DPF01	1234567	8/2/05
1902	ISB	2000	DPF	Johnson Matthey	CA/JMI/2005/PM3/N00/ON/DPF01	1234568	7/29/05
1903	ISB	2000	DPF	Johnson Matthey	CA/JMI/2005/PM3/N00/ON/DPF01	1234569	8/23/05

1/1/2005 PM Baseline

	2) Listed By Corresponding Model Years (Fill in columns A-H ONLY)								Emissions Calculations (Do not write in these boxes)							1.1
1) Engine Model ID	74-87	88-90	91-93	94-06	Retrofit Level 2 (DPF) 94-06	Retrofit Level 3 (DPF) 94-06	2007 or 0.01g Engine	Total	Pre-88 1.0g	88-90 0.6g	91-93 0.25g	94-06 0.1g	Retrofit Level 2 (DPF) 94-06	Retrofit Level 3 (DPF) 94-06	2007 or 0.01g Engine	PM Total
A230c				1				1				0.1				0.1
ISB				10				10				1.0				1.0
														PM Grand Total		1.1

NOx – 1/1/2006

	2) Listed By Corresponding Model Years (Fill in columns A - H only)								Emissions Calculations (Do not write in these boxes)								NOx Avg.
1) Engine Model ID	Pre-88	88-90	91-97	98-02	03-06	Pre-2004 Alt Fuel	2004+ Alt Fuel	Total	Pre-88 10g	88-90 6g	91-97 5g	98-02 4g	03-06 2.2g	Pre-2004 Alt Fuel 2.2g	2004+ Alt Fuel 1.5g	NOx Total	3.25
ISB				7				7				28				28	
ISB					3			3					6.6			6.6	
C175					1			1					2.2			2.2	
B5.9G						1		1						2.2		2.2	
Total:				7	4	1		12				28	8.8	2.2		39.0	

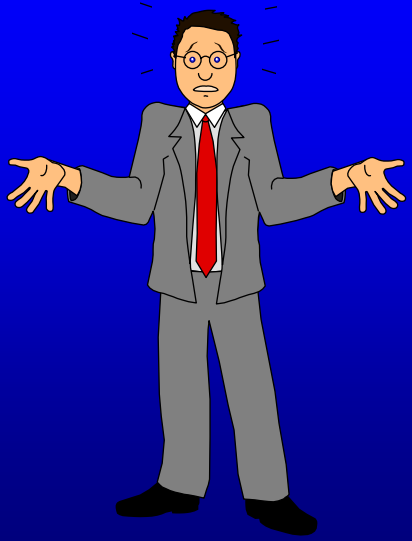
NOx – 12/31/2007

	2) Listed By Corresponding Model Years (Fill in columns A - I only)								Emissions Calculations (Do not write in these boxes)								NOx Avg.
1) Engine Model ID	88-90	91-97	98-02	03-06	Pre-2004 Alt Fuel	2004+ Alt Fuel	2007	Total	88-90 6g	91-97 5g	98-02 4g	03-06 2.2g	Pre-2004 Alt Fuel 2.2g	2004+ Alt Fuel 1.5g	2007 1.2g	NOx Total	2.62
ISB			5					5			20					20.0	
ISB				3				3				6.6				6.6	
C175							1	1							1.2	1.2	
ISB							3	3							3.6	3.6	
Total:			5	3			4	12			20	6.6			4.8	31.4	

Reporting Summary

- January 31st of each year thru 2016
  - Number, manufacturer, make, and model year of engines and fuel used
- January 31, 2006 Report
  - TFV PM Baseline as of 1/1/2005
  - TFV Fleet as of 1/1/2006
  - TFV NOx Fleet Average as of 1/1/2006
  - TAs proposed actions to achieve the 12/ 31/ 2007 NOx requirements
- Late Penalty of $100 per day

Questions ?



Implementation Workshops

- May 25, 2006: Fresno, 1:30 to 3:00
- May 30, 2006: Sacramento, 1:30 to 3:00
- May 31, 2006: Redding, 1:30 to 3:00
- June 7, 2006: San Diego, 1:30 to 3:00
- June 13, 2006: Santa Rosa, 1:00 to 2:30
- June 14, 2006: San Jose, 1:30 to 3:00
- June 19, 2006: Burbank, 10:30 to 12:00
- June 20, 2006: Riverside, 8:30 to 11:00

Transit Listserve

- Transit Fleet Vehicles:
  http://www.arb.ca.gov/listserv/bus-tfv.htm
- Urban Buses:
  http://www.arb.ca.gov/listserv/bus-ub.htm

Contact Information

Fleet Rule For Transit Agencies

www.arb.ca.gov/msprog/bus/bus.htm

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